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ABSTRACT

Presentation material and dialog is provided from a workshop designed to acquaint educators, planners, designers, and other interested parties with contemporary issues impacting the planning and design of educational facilities in the 1990s'. The workshop examined the critical elements and trends in school planning and design, discussed how quality planning and design can enhance the educational process, and explored how to best address tomorrow's technology in today's school facilities. Speaker topics include the need for educational facilities today, the team process in facility planning, decision making for major costs, the role of the superintendent in school planning and design, school planning and design for the next century, curriculum contemplations, the impact of technology on education and educational systems, and a technology checklist to better interface facility design with technology and educational needs. Two educational facility design case studies conclude the document. (GR)

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ED 460 604

SCHOOL PLANNING AND DESIGN

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This publication is a synopsis of a workshop on School Planning and Design held in Chicago, Illinois, May, 1990. The school on the cover is Capital High School in Sante Fe, New Mexico designed by Perkins & Will Architects and Mimbres, Inc. Architects.

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Introduction

The Council of Educational Facility Planners, International planned and presented a national workshop designed to aquaint educators, planners, designers, and other interested parties with contemporary issues impacting the planning and design of educational facilities in the 1990's. This workshop was held in Chicago, Illinois in May, 1990 and was attended by reperesentatives of twenty-six states and three Canadian Provinces.

The workshop theme was based on four program goals. They were as follows:

- To examine the critical elements of school planning and design
- To explore the current trends in school planning and design
- To discuss how quality planning and design can enhance the educational process
- To discuss how to best address tomorrow's technology in today's school facilities

The workshop format provided both large and small group discussions and focused on interaction between the presenters and participants. The information contained herewith is a summary of both the presentations and dialogue which took place in our workshop.

Acknowledgements

The Council of Educational Facility Planners, International is fortunate to have great resources in its membership whose knowledge, understanding, and experience in educational facility development is unmatched worldwide. It is with pride and gratitude that we thank the outstanding professionals who shared their expertise as presenters at our School Planning and Design Workshop.

Steven Bingler, AIA , President of Concordia Architects in New Orleans. Mr. Bingler's thorough analysis of school projects leads to optimum results for the user. He is helping to bring new approaches to school design that enhance school environments.

C. William Brubaker, AIA, Vice Chairman of the Board of Directors of the Perkins & Will Architectural Firm in Chicago. Mr. Brubaker is known as one of the countries foremost authorities on school design. He has extensive experience in the design of all types of educational facilities.

Richard Fleischman, AIA, President of Richard Fleischman Architects in Cleveland. Mr. Fleischman brings great creativity and enthusiasm to each project. His designs create an environment that enhance the learning process.

Cliff Gross, AIA, President of GTde Architects in Seattle. Mr. Gross leads the way in interpreting a school program that leads to functional school design. He is a nationally know speaker on subjects related to school architecture.

Tony J. Wall, Executive Director of CEFPI. Mr. Wall is a nationally known authority on the issues facing educational facility planners. He has had a wide variety of experience in school projects -- taking them from inception to occupancy. His responsibilities included all phases of facility development, from planning to occupancy. Mr. Wall's extensive background in planning, construction, and as a school administrator enables him to provide us with a comprehensive look at school projects.

Phoebe Wienke, Ph.D., President of Phoebe Wienke & Associates is an experienced school administrator and an expert in understanding societal changes, trends and issues. Dr. Wienke's broad based background leads to an outstanding understanding of the issues all schools must prepare to deal with in the 90's and beyond.

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The Need for Educational Facilities Today Across the U.S.A.

In 1989
education construction
reached an
all-time high
for the fifth straight year

$14.1 billion

An increase of 13% over 1988

Education Construction, 1989

The National Picture ($000's)

School Districts (K-12)	$ 3,655,816	New	$9,277,561
	$ 2,951,617	Additions	
	$ 2,670,118	Modernizations	
2-Year Colleges	$ 592,941	New	$ 985,997
	$ 156,533	Additions	
	$ 236,523	Modernizations	
4-Year Colleges	$ 2,340,093	New	$ 3,833,554
	$ 454,302	Additions	
	$ 1,039,159	Modernizations	
All Education	$ 6,588,850	New	$ 14,097,112
	$ 3,562,462	Additions	
	$ 3,945,800	Modernizations	

Source: AS & U

Education Construction, 1989

The Regional Picture -- Schools (K-12) ($000's)

Region	1989 Construction	Change 1988-1989
1	$ 521,041	3.4 %
2	927,980	4.0 %
3	702,551	18.5 %
4	2,629,771	37.4 %
5	1,143,176	19.0 %
6	1,101,194	3.3 %
7	312,098	0.7 %
8	323,472	(-19.4 %)
9	1,288,705	34.0 %
10	327,573	7.2 %
National	$9,277,561	17.3%

Breakdown of Regions								
Region 1	ME	NH	VT	MA	RI	CT		
Region 2	NY	NJ						
Region 3	PA	DE	MD	DC	VA	WV		
Region 4	NC	SC	GA	FL	KY	TN	AL	MS
Region 5	OH	IN	IL	MI	WI	MN		
Region 6	AR	LA	OK	TX	NM			
Region 7	IA	MO	NB	KS				
Region 8	ND	SD	MT	WY	CO	UT		
Region 9	NV	CA	AZ	HI				
Region 10	OR	WA	AK	ID				

Source: AS & U

Education Construction, 1989

The Regional Picture -- Colleges ($000's)

Region	2-Year Colleges	Change 1988-1989	4-Year Colleges	Change 1988-1989
1	$ 77,020	0.8 %	$311,692	14.5 %
2	113,510	(-8.8 %)	448,269	11.5 %
3	57,518	(-7.0 %)	530,058	(-4.4 %)
4	192,868	(-9.0 %)	759,811	26.8 %
5	148,163	(-1.0 %)	588,496	0.0 %
6	121,769	(-2.5 %)	303,808	(-5.9%)
7	36,613	(-14.5 %)	305,659	4.2 %
8	36,374	15.9 %	63,151	18.9 %
9	165,969	9.6 %	447,384	13.9 %
10	36,193	7.1 %	75,226	9.7 %
National	$ 985,997	(-2.2 %)	$ 3,883,554	8.1 %

Breakdown of Regions

Region 1	ME	NH	VT	MA	RI	CT		
Region 2	NY	NJ						
Region 3	PA	DE	MD	DC	VA	WV		
Region 4	NC	SC	GA	FL	KY	TN	AL	MS
Region 5	OH	IN	IL	MI	WI	MN		
Region 6	AR	LA	OK	TX	NM			
Region 7	IA	MO	NB	KS				
Region 8	ND	SD	MT	WY	CO	UT		
Region 9	NV	CA	AZ	HI				
Region 10	OR	WA	AK	ID				

Source: AS & U

Education Construction, 1989

The Regional Picture --

New Construction vs. Additions & Modernizations ($000's)

Region	New	Add/Mod	New	Add/Mod
1	$ 220,536	$ 689,217	24.2 %	75.8 %
2	516,710	973,049	34.7 %	65.3 %
3	542,642	747,485	42.1 %	57.9 %
4	2,027,406	1,555,044	56.6 %	43.4 %
5	772,967	1,106,868	41.1 %	58.9 %
6	740,610	786,161	48.5 %	51.5 %
7	345,427	308,943	52.8 %	47.2 %
8	172,032	250,965	40.7 %	59.3 %
9	1,022,117	879,941	53.7 %	46.3 %
10	228,403	210,589	52.0 %	48.0 %
National	$ 6,588,850	$ 7,508,262	46.7 %	53.3 %

Breakdown of Regions

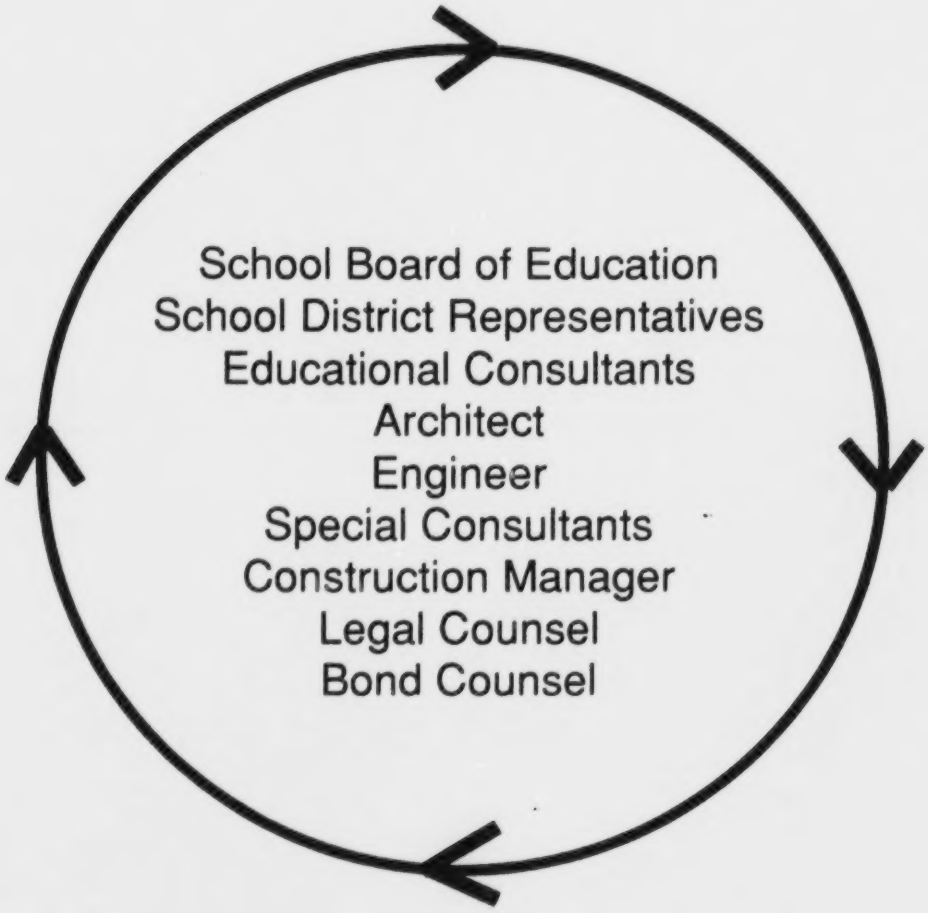
Region 1	ME	NH	VT	MA	RI	CT		
Region 2	NY	NJ						
Region 3	PA	DE	MD	DC	VA	WV		
Region 4	NC	SC	GA	FL	KY	TN	AL	MS
Region 5	OH	IN	IL	MI	WI	MN		
Region 6	AR	LA	OK	TX	NM			
Region 7	IA	MO	NB	KS				
Region 8	ND	SD	MT	WY	CO	UT		
Region 9	NV	CA	AZ	HI				
Region 10	OR	WA	AK	ID				

Source: AS & U

Educational Facility Planning

-- It Takes a Team

Planning is a Team Process



Primary and **secondary ROLES** change throughout the project, allowing the professional with the greatest expertise to lead specific phases of a project.

The Planning Process

Demographics

- Historical Enrollment Data
- Enrollment Projections (10 yr.)
- Housing Patterns
- Zoning Regulations
- Infastructure Plans, Roads, Utilities

Societal and Educational Trends

- Megatrends
- Societal Changes Impact Education
- Educators Response

Facility Evaluation and Needs

- Educational Adequacy
- Educational Environments
- Physical Condition
- Capacity vs Enrollment
- Accommodating Technology
- Accommodating Program Change

Educational Adequacy

- How Well the Classroom Relates to the Instructional Program.

Educational Environment

- The Total School Environment for Learning

Educational Specifications

- The Educators Vehicle for Communication with the Design Team
- Serves as the Design Team's Basis for Design
- Staff Development Activity
- Form Follows Function

Graphic Analysis

- The Design Teams Response to the Ed Spec
- Schematic
- Design Review

Final Design

- Design Development
- Construction Documents

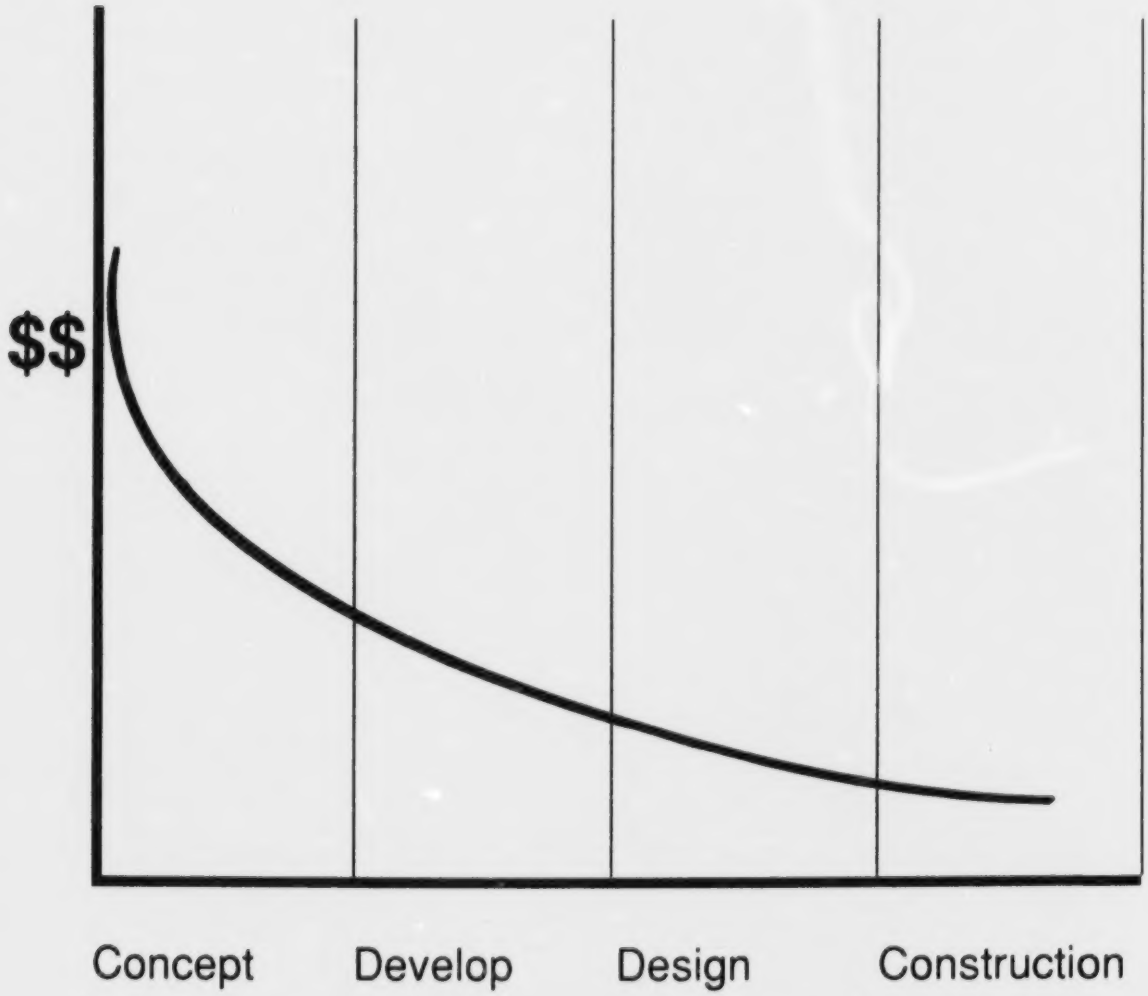
Educational Specifications

- General Considerations
- Instructional Objectives
- Activities to be Housed
- Persons to be Accommodated
- Amount of Space Needed (sq. ft.)
- Spatial Relationships
- Major Equipment
- Environmental Concerns

Educational Facility Planning

When Major Cost Decisions Are Made

Major Cost Decisions are Made Prior to Construction



The Role of the Superintendent

-- in School Planning and Design

The Role of the Superintendent in School Planning and Design

I. **The Superintendent needs to recognize the purpose of developing Educational Specifications (Ed Specs) in the planning and design process of either new or renovated facilities.**

   A. Facilities must be determined by understanding curricular and instructional needs.

   B. Specialists (educators) who will use the facility should have a primary role in determining needs and functions of the building.

   C. The principle, "Form Follows Function", is as valid in school design as in any other architectural creation.

II. **The superintendent has a unique opportunity to assert leadership with key players in the planning and design process, particularly in terms of accepting the importance and necessity of the Ed Spec process.**

   A. Board of Education members

   B. Staff members

   C. Community members

III. **The Superintendent can expedite the development of meaningful Ed Specs by securing the assistance of a consultant familiar with the planning process. The consultant can offer the following support.**

   A. Provide objectivity to the process by sorting out special interests and political bias from valid criticism and legitimate concern.

   B. Manage the focus of the group charged with developing the Ed Specs.

   C. Continually and consistently direct the attention of the group to the task at hand, assuring cost effective time usage.

   D. Allow the Superintendent's primary attention and time usage to be directed toward the multitude of general district administrative responsibilities.

   E. Insure a comprehensiveness in the final Ed Spec package equitably representing all areas of curriculum.

   F. Serve as a scapegoat, if necessary, to minimize negative attacks on the Superintendent or Board of Education by disgruntled or skeptical community members, concerning the Ed Spec process or the construction/renovation project.

IV. **The Superintendent promotes on-going staff development through advocating the Ed Specs development process.**

A. The resistance of some staff members to moving forward in the place of maintaining the status quo is easily exposed.

B. Opportunities abound to reinforce innovative thinking and to encourage and reward leadership skills among staff members.

C. School planning and design provides the Superintendent the opportunity to give staff members "permission to be professional" by offering time, money, comfortable surroundings, and encouragement to actively engage in the creative process.

V. **Finally, the Superintendent's role in the process is one of being visible.**

A. The process is solidified and validated by the Superintendent personally interacting with committee members, visiting with the committee-of-the-whole, and holding up-date meetings with the consultant.

B. On-going reports to the Board of Education convey information and awareness of the progress of the Ed Spec development process.

C. Media releases insure the community of the Superintendent's involvement and inform them of the progress of the planning process.

Forces Impacting America

Forces Impacting America

- Global Interdependence
- Aging Population
- Workers and the Workforce
- Cultural and Social Issues
- Knowledge/Technology Explosion

Global Interdependence

Examples Include:

- World-wide Free Trade
- One Single Economy
- Regional Trade Between Countries vs. States
- Pacific Rim vs. Atlantic

- Standard American Symbols are becoming merely American Facades with Japanese Financial Backing

Aging Population

- Percent of Population under 18 years:

  1970 = 34%
  1983 = 25%
  2010 = 21%

- 50 million women today are having fewer babies than 33 million women had during the baby boom.

Baby Boom	**1946-1964**
Baby Bust	**1964-1978**
***Echo* Baby Boom**	**1978-1996**

U.S. School Enrollments

- Elementary School Population (K-8)

  1970 = 37 million
  1985 = 31 million
  1990 = 33 million
  1995 = 35 million
  2000 = 32-34 million

- High School Population (9-12)

  1970 = 17 million
  1985 = 14 million
  1990 = 13 million
  1995 = 14 million
  2000 = 15 million

1970 = 4 million more 5-17 year olds than 25-44 year olds.

Today = 33 million more 25-44 year olds than school age children.

More persons over 65 than teenagers.

65% of all the people who've ever lived beyond 65 are alive today.

36,000+ people over 100 years old today.

3.1 million people alive today are over 85!

Baby Boomers

- Middle Age
- Middle Class
- White

Young Children

- Fewer in Numbers
- Minorities
- Poor
- Insufficiently Educated

When our numbers were high we could pick from the "cream" for our jobs. When our numbers are scarce we must dig deeper into the barrel.

Average American Worker

White = 31
Black = 25
Hispanic = 22

50% of new workers today are non-white, women, or immigrants.

By 2000, 85% will be non-white, women, immigrants,or all of the above.

Social Security Program

1930 = 63 workers to support every retiree
1950 = 17 workers to support every retiree
1960 = 5 workers to support every retiree
1992 = 3 workers, and one will be minority
2020 = Baby Boomers will be retired

Women in the Workforce

7 out of 10 women are in paid work force

85% between 25 and 44 are working

53% of married working outside the home

73% are of child bearing age

Working Mothers

New mothers returning to work within one year of giving birth:

1977 = 31%

Today = 50%

70% of School age children have working mothers

5% of U.S. companies help employees with child care

Fewer than half of teenage mothers finish high school

Immigrants and Minorities

- By the year 2000:
  1 out of 3 persons will be non-white
  48% of school age will be ethnic minority.
- 2/3's of world's immigrants come to U.S.
- 44% of immigrants are Hispanic.
- 10% of new mothers in U.S. are from another country.
- World population = 5 Billion
  18% white...and declining.

U.S. Population Increases

	1960-85	1986-2011
White	+27%	+14%
Blacks	+53%	+39%
Hispanics	X	+120%
Other	X	+56%

USA Fertility Rate

After WWII = 3.7 children per female

Current = White 1.8 children per female
Black 2.4 children per female
Hispanic 2.9 children per female

(Need 2.1 children per female to maintain)

U.S. Labor Force

Year:	1985	1985-2000	Increase/
Workers:	115,461,000	20,000,000	Decrease
Native White Males	47%	18%	-29%
Native White Females	36%	42%	+6%
Native Non-white Males	5%	8%	+3%
Native Non-white Females	5%	12%	+7%
Immigrant Males	4%	10%	+6%
Immigrant Females	3%	10%	+7%

Public School Students

25% Achieve at high levels

25% Learn basic skills and may pursue college or other adult education

20-30% Graduate, but are FUNCTIONALLY ILLITERATE

25-30% Drop out of school

1989 Drop-out Rates

National Rate 26.7%
4000 per DAY -- 1 MILLION per YEAR

Louisiana	38.4%
Florida	36.5%
Georgia	35.0%
Mississippi	34.4%
Texas	34.1%
New York	33.3%
Tennessee	32.8%
South Carolina	32.2%
Kentucky	32.1%
California	31.5%

Dropping out is not a sudden decision made by a 16 year old.

It is the culminating act resulting from years of frustration and failure.

Drop Outs

- 52% are unemployed and receiving welfare

- Lost earnings and Tax collection ($240 billion each year)

- 60-80% of prison inmates are drop outs (Costing taxpayers $24,000+ per inmate per year)

- 87% of pregnant teenagers are drop outs

"At-Risk" Children

15,110 school districts in the U.S. -- 40 million students
1/3 are "At-Risk"

Has resulted in:

Unprecedented Diversity

Unprecedented Challenge

Severely premature survivals
30% chance of permanent damage.

13% of babies born today are drug addicted.

No prenatal care.

Family Status

Of Every 100 Children Born today:

12 born out of wedlock
40 parents who divorce
5 parents who separate
2 one parent will die
41 reach 18 "traditionally"

60% of Today's children will live in a single parent household sometime before 18.

Middle Class Threatened

44% of the U.S. $$ belongs to the upper 5% of society

Today, 1 in 5 live in poverty, by 2000, 1 in 4

Between 1973 and 1986, family earnings went down $262 per year

American Dream = Health-Home-Auto

Knowledge/Technology Explosion

"Content" Learning is obsolete

Knowledge in 1900 doubled by 1950
Doubled again by 1960
Doubled again by 1965
Currently doubles every 18 months

By the time a child born in 1988 reaches 50 years old, 95% of all knowledge ever known will have occurred in his/her lifetime.

Multi-sensory interactive communication is the future reality of educational instruction and....it is available TODAY!

Planning and Designing Schools for the 21st Century

General Ideas on Planning & Designing Schools for the 21st Century

- The future will arrive ahead of schedule. Much of the future will be determined by decisions we make.
- Change is inevitable. Change will be rapid and continuous. People differ in their readiness to accept change. (Innovators = 3%, Leaders = 13%, Early majority = 34%, Late majority = 34%, Resistors = 16%.)
- The modern shopping mall provides flexibility and variety to respond to changing demands of the consumer. Schools need the same features to meet the changing requirements of the operation.
- Modern office buildings may be useful prototypes for schools. Such facilities are constructed without knowing tenants; with space to accommodate large and small firms; and with structural, mechanical, electrical systems that allow future users to arrange and rearrange to suit their needs.
- Rather than placing classrooms in "egg carton" fashion along corridors, open space, as found in office buildings, may be more appropriate.
- Schools will become smaller in size and more personable.
- Satellite learning facilities may be the wave of future high schools. Hospitals, shopping centers, museums, research labs, factories may serve to provide a new set of on-site learning options.
- Our country's population will continue to age with fewer numbers in school age categories.
- School populations will become both younger and older and more ethnic and culturally diverse.
- The modern school serves as a *community* center for educational, cultural, and recreational activities. Facilities will need to be available for programs serving the very young to the senior citizen.
- School facilities should include community spaces for meetings, education, activity, food service and all need to be accessible to the handicapped.
- Because of the mixture of civic, community and educational activities, environments should be varied in size, shape, color, and lighting. High-tech, yet home-like comfort should be considered.
- Education will become truly lifelong; a *part* of life, not *apart* from it.
- Early childhood education centers and day care facilities will be incorporated with elementary school sites. (PL99-457 requires pre-school programs be in place by 1991-92 for three-four-five-year-old children with handicaps.)
- Students will need individual space for study, storage, and discussions with teachers and perhaps other students. From this space the student will go to lecture rooms, labs, studios, the library, the gym, and the cafeteria, returning to the home base when desired.
- The world of work will continue to shift from an industrial work force to an information, service, and high-technology work force with jobs at all levels becoming more technical and sophisticated. Workers will need to manage information and work with people which will call for high-level thinking skills and adaptability.

- Workers will need to shift from one job to another as many as five to seven times over the course of their careers.

- Teenagers may enter the work force at earlier ages, working longer hours. Educators will need to rethink school schedules and the role of homework.

- The world will continue to become more globally interdependent with increasing cultural and ethnic diversity.

- Families will continue to be diverse with no single family type representing the majority of Americans.

- The focus of control in education will continue to shift from the federal to the state level and from central offices to individual buildings. Teachers will need to share in decision making concerning all aspects of the local operation.

- Taxpayers will continue to resist paying for schools. Alternate forms of funding will be determined with business playing a major role in this regard.

- Our society will demand an even more convenient life-style, expecting all goods and services to be delivered with ease and speed and, naively, with no increase in costs.

Curriculum Contemplations

Curriculum Contemplations

- Programming and determining how educational spaces relate are the most critical phases in the initial design of a school.

- Content learning will become obsolete. The focus and emphasis will be on process and application. Curriculum will change from presenting data to evaluating and synthesizing ideas, and solving "real-world" problems.

- Our emphasis will change from what to learn to how to learn.

- Curriculum is shifting from accent on parts and elements to an emphasis on wholes and patterns. Relationships and patterns diminish isolation and integration becomes meaningful.

- Learning will be centered around ideas and problems, not fragmented into separate subject areas controlled by lock-step scheduled days.

- As curriculum shifts, functional interrelationship between isolated subject areas and other activities will move beyond mere interdisciplinary to transdisciplinary webs of linkage. For example:

  Math-Science-Home Arts
  English-Media-Theatre-Foreign Language
  Social Studies-Foreign Language-English
  Humanities-Social Studies-Government
  History-English-Science
  Home Arts-Health-Social Studies-Science
  Physical Education-Humanities-Music
  Technology will be infused in all program areas.

- Independent study will be a new force in education, supplemented by small and large group activities.

- Learning experiences for students will be differentiated for personal relevance rather than whole groups pursuing essentially the same answers through limited like activities

- Cooperative Learning activities are essential for students to learn collectively, fostering connection among learners and emphasizing nonlinear interaction in problem solving. An emphasis on group task performance and problem solving in the workplace calls for collaborative learning with shared responsibility for performance and evaluation.

- Students, using a thematic problem solving approach, will form cross-age groups to use modes of inquiry from a variety of disciplines to define, refine, and attack problems of concern or interest to them.

- Methods of assessment will change from measuring mastery of descriptive knowledge to evaluating attainment of higher-thinking skills.

- Students will demonstrate mastery of learning concepts through exhibitions, demonstrations, and portfolios, rather than rote test taking.

- The Regular Education Initiative (REI) will lead to collaborative teaching with general education teachers and special education teachers forming partnerships to more fully integrate special education students with the general population and to more adequately meet the needs of "at-risk" students in general education classes.

- "Learning-while-doing" will become a more significant component of occupational education.

- "Community" education calls for students to interact with their community. It extends education to the working world ("real world".). Such programs will revolve around "service" learning and career exploration activities which focus on real problems.

- Physical Education and Athletics are different. Schools and communities will probably continue to appreciate competitive sports, but emphasis in physical education will be placed more on lifetime fitness activities and exercise physiology. Athletics may become the domain of groups outside of the schools.

- Whole language rejects the separation of the various aspects of the language process. Literature, art, music, and drama are important ways to express the intertwine of process and content.

- Citizens of the future will have calculators, computers, and other technology to do basic computation for them. They will instead have to recognize how to formulate mathematical problems to go about solving mathematical situations and communicate with others about those solutions.

- New curricular issues may revolve around ethics, law, humanities, values, and self-awareness.

The Impact of Technology on Education

The Impact of Technology

- The role of teachers of the 90's...into the 21st Century is to be the *guide on the side* rather than the *sage on the stage*! Teachers will become "coaches" of student learning.

- Shifts in teaching will occur so that computer-supported collaborative learning becomes a major type of student interaction.

- The focus of curriculum in the 21st Century will not be on increasing content knowledge. Instead, the emphasis will be on acquiring skills which will help the student to access the huge amount of information and data that will come at them. This will become more feasible through the use of technology.

- Instructional uses of computers can be divided into three parts:

  Learning about computers (literacy, computer science, programming, theory)
  Computer-as-tool (word processing, integrated instruction, use as aid to problem solving throughout the curriculum)
  Learning using computers (CAI, interactive learning, navigating through knowledge)

- Technology calls for lots of electrical access plus surge protectors.

- Telecommunications will become a dominate mode of learning. Classrooms need to be wired for fiber optics. Dedicated phone lines for modems should be wired to all learning areas. RF modulators allow for computers to interface with TV screen. LCD screens allow for projecting computer images on overhead screens.

- Classrooms need compact technology control stations. Labs/shops will use computers to display graphics. Computer disk storage will replace file cabinets. Health/PE will have computer controlled fitness equipment. Art will use computers, lasers, TV, robotics. Music will use synthesizers and computer graphics. Drama will benefit from computer controlled lighting and projection techniques.

- Voice activated input devices are available today in advanced science settings and will one day be cost effective in replacing keyboarding in our school/work settings.

- Each student needs his/her own study space equipped with computer. A series of such spaces could be grouped together in pods surrounding a more highly equipped library/media center.

- Students will use "electronic notebooks". Individual learning will become reality with independent study supplemented by small and large group activity.

- Technology tools will increasingly be designed for use by teams rather than individuals in isolation.

- Special learners and "at-risk" students show significant learning gain through the use of computers. Robotics will play a major role in allowing the severely handicapped to participate in a school setting.

- "Cognition Enhancers" combine the complementary strengths of a person and information technology; empowering environments and using hypermedia.

- Databases, spreadsheets, and Cadd empower work environments so people can focus on higher level thinking and the creative aspects of problem solving.

- Hypermedia, also a cognition enhancer, is a framework for creating an interconnected, web-like representation of symbols in the computer. The student can traverse the network along alternative paths and links seeking the right sequential stream for his/her content or goals. Hypermedia enables the integrated curriculum.

- Education will become more integrated/infused with daily life in home and community. Learning can occur at home or on the job, and be interactive.

- Job skills are changing dramatically due to technology. Advance technology eliminates jobs as well as creates them. Contrast the effort on the grocery store clerk versus the typist/secretary.

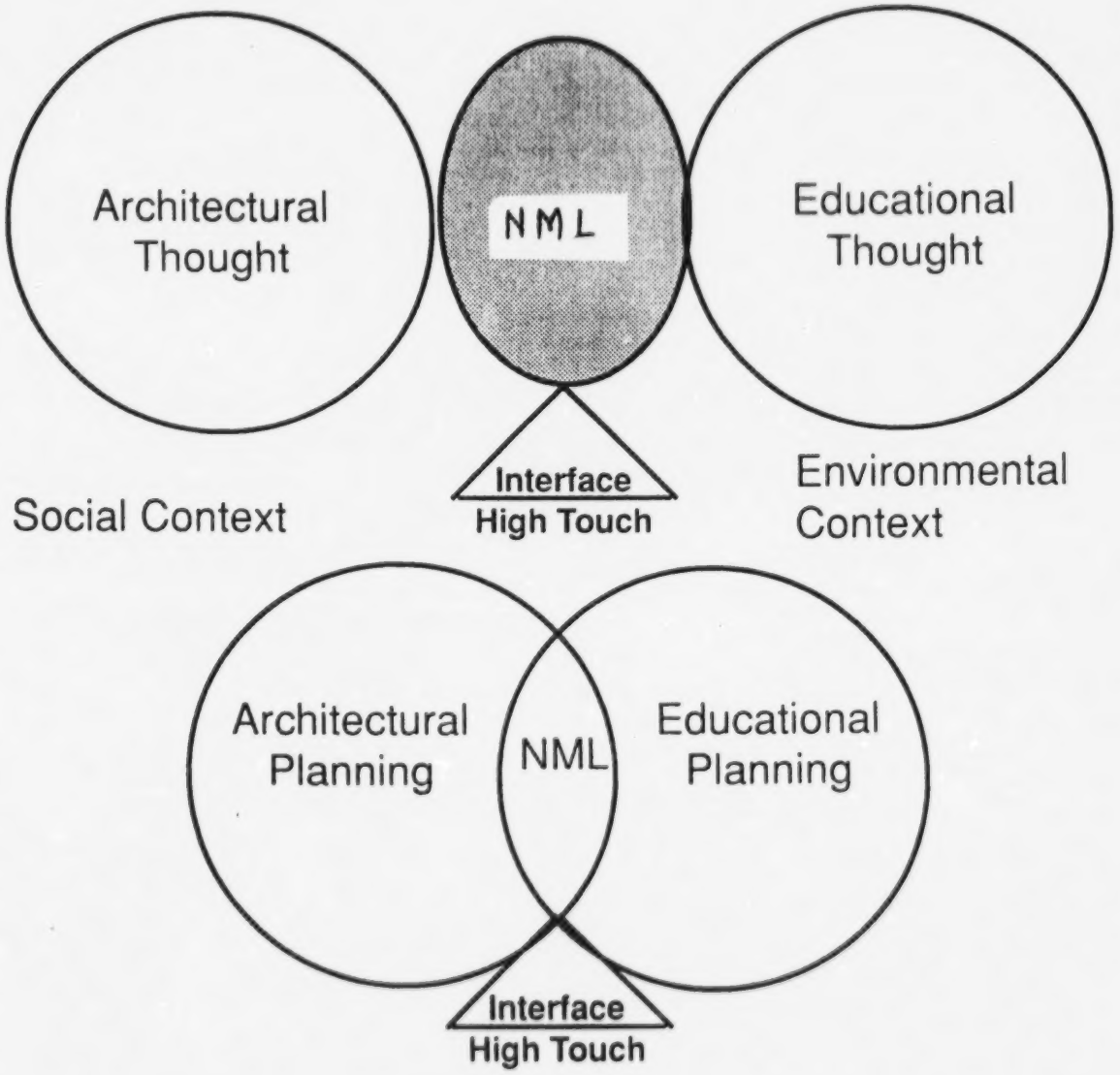
- Business will become more involved in education and the use of technology providing expertise, equipment, and funds.

- As the routine parts of work are automated, a greater proportion of decisions will require stressful ethical choices.

Technology Checklist

Technology Checklist

Eighty percent of the difficulty we experience in addressing technology in todays schools occurs in the "no man's land" (NML) between what architects think and what educators think. The solution is to interface these thoughts, concepts, and ideas through shared planning.



I. Define Educational, Management, and Trend Potential of Each Major Technology System.

A. Computers

B. User Devices

C. Telecommunications

D. "High Touch"

II. Define Demographics of Facility Users

A. Traditional Students

B. Community Uses

C. "Teacher"

D. Cultural Objectives

III. Define Educational Philosophy

A. 3 R's

B. Individualization of Education

C. Collectivization of Education

D. Site-Based Management

IV. Design "Tech Systems" that Implement Educational Philosophy

A. Computers

1. Mainframe
2. Mini-mainframes
3. PC's
4. Laptops
5. Other

B. User Devices

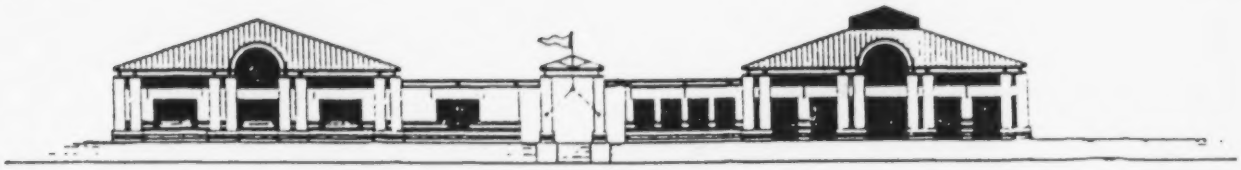
1. Software
2. Video / VCR
3. Copiers
4. Networking
   a. district wide
   b. on-site staff
   c. students
5. Cyberspace

C. Telecommunications

1. External Sources
2. Internal Sources
   a. internal distribution
   b. external distribution
3. Fiber Optics

D. Define Adaptable Environment

Case Study
DeSoto Parish, Louisiana



ELEVATION - LIBRARY AND MUSIC BUILDING AT ELEMENTARY SCHOOL

INTRODUCTION

In September, 1988 a symposium focusing on the criteria for the design of new educational facilities was held in Boston, Massachusetts. Co-sponsored by Concordia Architects and the Massachusetts Institute of Technology, the symposium's goal was to review the preliminary design of a school facility for 2,500 students, in grades K - 8, designed by Concordia Architects for the Mansfield District of De Soto Parish, Louisiana. Participating on the panel were some of America's leading educational theorists and practitioners.

Many of the conditions affecting education in the small town of Mansfield, Louisiana are common to school districts throughout America. There is an existing but deteriorated infrastructure of school facilities on scattered and crowded sites; demographics indicate a large lower grade census with an almost equally balanced racial mix, a limited capital budget for construction in the lower one quarter percentile on a national average, and a school board mandated educational policy emphasizing the measurement of student performance by standardize achievement testing. The Mansfield schools were seen by the panel as an opportunity to identify some of the current and widespread needs confronting the design of new educational facilities nationwide.

DESIGN SYMPOSIUM SUMMARY

Throughout the two day symposium, the panel discussed a broad range of educational issues relating to the design of educational facilities. In this case study we will focus on those aspects of the discussion that had the most direct bearing on the final shape, size and character of the architectural design in Mansfield. Although there are obviously many overlaps, we have organized the panel's responses as they relate to six general categories: community, identity, security, information systems, teamwork, and flexibility.

Key to the discussions was how overall facility planning and architecture could enhance these concepts through the design of a proactive and supportive educational environment. Following are some excerpts from the dialogue.

COMMUNITY

Because the general public of parents and civic organizations in small towns inevitably use school facilities for after-hour meetings and community events, Concordia had sought to embody the principle of community in the bricks and mortar of the De Soto project from the start. Explained Bingler, "Adults in the community feel awkward going into a school and finding their way to the gym or library to have a public meeting. We have designed a civic center with its own entrance." Although this idea is not new to educational facility design, the extent to which facilities can be shared can be expanded beyond the gymnasium and auditorium to create a more cohesive community center. Bingler responded, "Maybe the most important image we can create here is the image of the country club - one that everybody in the community can belong to."

Wapner said,"The reverse is also true. One thing that seems implicit in your general assumptions is that all teaching takes place in the school. What about the home? Do you expect miracles out of the school systems? Something very interesting could be developed with respect to this proposal if you brought parents in to share in their children's development. Don't think of this only as a community center, but also as a place where the community family, so to speak, could learn how to teach the children along with the teacher. How do we change our old value system with respect to the relationship between child, family, and teacher?"

Edwards questioned the breadth of Wapner's position. "I really don't know what you are saying about the role of the school and the parents and how they cross. It's unrealistic to think that two working parents - some of them holding down two jobs each, can do that. They might like to spend structured time in the school, but when they get off that second shift, they're just too tired. Then you have other parents who have been so turned off by the schools they went to they don't even want to associate with academics. They may want an academically oriented thing for their child, but not for themselves. For that kind of parent, the community center has to feel like a very different kind of place - non-academic."

IDENTITY

Identity was one of the themes that cropped up repeatedly during the conference's formal sessions and in informal discussions before and after.

It was applied both to individual students and to the larger subdivisions of the institutional whole: classes and grades. Concordia had the idea in mind from the earliest phases of planning the Mansfield project: "The lower and upper schools each have separate identities on opposite sides of an internal roadway," Bingler explained. "And beyond that, each school has its own center of gravity by virtue of a separate courtyard or outside space."

Johnson urged that the concept of identity be extended to teachers as well. "I think we should get away from the sense that the teacher has his or her own room with a desk," said Johnson. "There ought to be a room where all of the faculty have their desk so there's a chance for contact and interaction." "And they should have there own secretary," said Edwards. "What professionals do you know other than teachers who don't have a secretary?" "For my nickel," said Gardner, "these teacher-space issues are essential. You can have a beautiful prize-winning school, but if you have dispirited teachers who don't have a closet of their own, you are undercutting yourself. These issues are more important than some of the glitzier more futuristic stuff."

SECURITY

The discussion of campus security encompasses much more than the policing of corridor and locker rooms. It found expression in the overall design of a campus subdivision by road and courtyard into three separate schools. Papert, for one, wondered if security didn't loom too large in the design of the Mansfield schools "What is security," asked Papert, "an euphemism that refers to drug pushers?" "Yes," said Johnson, rising to the bait, "and also for big kids beating up on little kids, or extorting lunch money. Security is safety from accidents, when big kids play too rough and break little kids' arms. And when older kids stand around they sometimes make fun of the younger kids, and pretty soon, the little kids won't play children's games. You get punk rockers in fourth grade."

It was surmised that one important ingredient in developing security and diminishing vandalism could be to develop a sense of pride and ownership on the part of the students, faculty and parents.

It was agreed that the issue of security and sense of well being for students and teachers are impacted in subtle ways by the organization and character of the architecture.

INFORMATION CENTER

As innovative as any of these ideas on the table, the information center - a combination library, computer center and study space - drew close and generally enthusiastic attention.

"What should it look like?" mused Bingler. "A big undefined barn with wires in the walls?" Most agreed the information center should be a cluster of smaller spaces, adjustable to the dictates of future needs. For now the facility would have to serve jointly as a traditional library and modern computer center for individuals as well as groups.

Edwards pointed out that having a bank of community accessed computers may help to alleviate inequities that are emerging between the technological "haves" and "have nots". Many children from disadvantaged families are finding it hard to compete with their peers who have their own personal computers at home. Our systems of public education is founded on the principle of equal information but the high cost of new information technologies puts poor children at a distinct disadvantage.

"I feel extremely enthusiastic about the idea of the information center growing into an important public thing," continued Papert. "But would a state-of-the-art computer-laden information center intimidate a community of predominantly working class adults?" "Not necessarily," said Papert, "if the center presented an accessible, enticing means of pursuing a popular pastime - sports, for instance. A dish could be installed outside, making it possible for community sports fans to watch matches all over the world in comfortable, intimate rooms." Who would teach the adult to use the equipment? "The kids," said Papert.

"Should most of the computer equipment be here in the center or in the classroom?" asked Monroe. "I have a bias toward the classroom where they'd be accessible all the time," said Johnson. "And I also have a bias toward working in groups at the computer - not a machine for every kid." "If you have a small number of computers, you get more mileage out of them in one central location like an information center," said Edwards. "With only one per classroom, there's the risk that the teacher will encourage only the bright kids to use it - after the 'serious' work is finished....Someday, though,a time will come when we'll have enough computers. This won't be an issue."

Edwards and others spoke out strongly against the tendency to make classroom computers passive adjuncts of centralized information sources. "We have to be very careful not to network," Edwards said. "In the first place, I don't think computer development is going that way; I think it is going toward the capability of kids having individual computers like individual calculators. But the networking systems I see now fall into the patterns of teacher control. Still, I've never met a teacher out there on the firing line who didn't advocate networking."

"Is it a financial question?" one panelist asked. "Is it simply cheaper to have a central control and keyboards for all the kids?" "No," said Papert, "keyboards and monitors comprise 80% of computer cost." Papert urged dual capability: "Although it isn't usually done," he said, "computers can operate independently and be networked, too. In our project we insist on both."

FLEXIBILITY

For all the strong opinions and informed insights about what lies ahead, the consensus of the conference was that the truly innovative school building would be the one that left ample room for the unknowable. Rather than design a school attuned to experts' best guesses about classroom needs and formats two to three decades from now, why not build opportunities for ambiguity to occur? Flexibility emerged as the key concept and the most desirable hallmark of the De Soto plan.

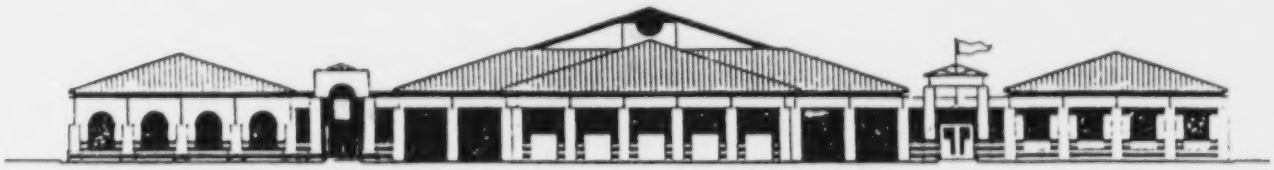
"I'm concerned about the shape of the typical classroom," said Johnson. "The usual rectangular shape lends itself to the lecture, whole-class discussion, individual-worksheet, take-the-test-home-on-Friday approach. But if the classrooms were square, you could move from the lecture to small groups, over to the computer, then back again for lecture." "In the best of all possible worlds," said Edwards, "I'd like to see round rooms with movable walls where you could make the spaces different sizes."

Said Gardner, "A lot of people are writing now about the ideas of 'schools within a school' because it's simply too hard to change an entire institution. Eighty percent of the faculty usually don't want change, and no one should pressure a teacher who prefers teaching in a room that looks like a closet. But for teachers who do want change, why not leave about 25% of the school up for grabs? Let teachers and students make proposals on how to use the space - then let them carry out their ideas."

"You have to be very careful with experimental space," said Edwards. "All too often these areas become the turf of the gifted or advanced classes. The low achievers get the more traditional regimen. And it is by no means true that the gifted kids are the most creative."

Answering Rand's concern, Monroe came down in favor of writing formats that, like classroom space, anticipated rethinking and revision. "We should forget trying to provide for every single possibility," she said. "Instead we should provide a way that things can be constantly updated and changed." Dickinson summed up the panel's consensus: "Build this school in a way that people who want to make change can do it," she said. "Create a nucleus, sow the seeds."

It was agreed that education theory is diverse and that it would be in a state of flux as new ideas emerge. The ideal school would be one where the classroom spaces and ancillary spaces could be expanded independently as the need arises and where space could be reserved for experimentation and orderly growth.



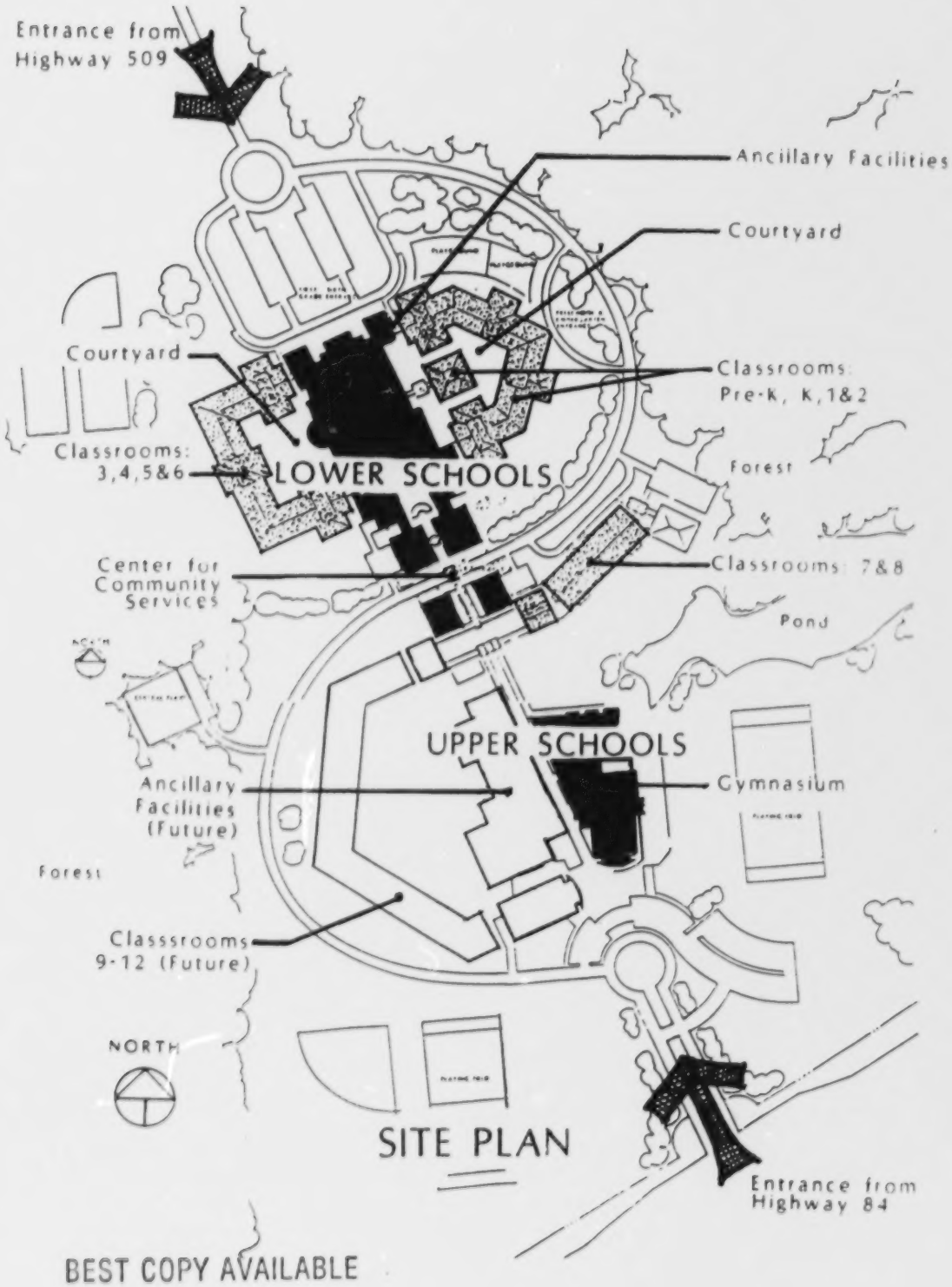
ELEVATION - ADMINISTRATION BUILDING AT ELEMENTARY SCHOOL

ARCHITECTURAL DESIGN SUMMARY

Following the symposium at MIT, the Concordia team returned to the drawing boards to apply the panel's ideas to the final design.

One of the most pressing issues was that of identity. A student population of over 2,500 (future 3,000) on a single site was a special challenge. One School Board member's initial assumption was that the site would be divided into distinct quadrants, each with a separate school.

However, the opportunity to create significant community residuals, higher administrative and operational efficiency, and greater flexibility through consolidation were compelling enough to encourage a more creative solution to the identity problems. Separation of younger children from older children was one of the most important identity issues. To accomplish this distinction, the campus was divided into "lower" schools and "upper" schools, each with its own core facilities and classrooms. Two lower schools included grades Pre-K through 6 and the upper school includes grades 7 and 8 (and future 9 - 12). The separation is made by an internal roadway that passes between the two campuses, (see site plan, next page). The lower school classrooms are divided into two distinct clusters, one for Pre-K through 2nd grade and another for 3rd through 6th. Each cluster has a central courtyard giving it a more personalized focus. The design team refers to these courtyards as "heart" spaces, where more individual school identity and personal ownership in the architecture will be accomplished by including each schools' teachers, students, and interested parents as participants in the courtyard design process.



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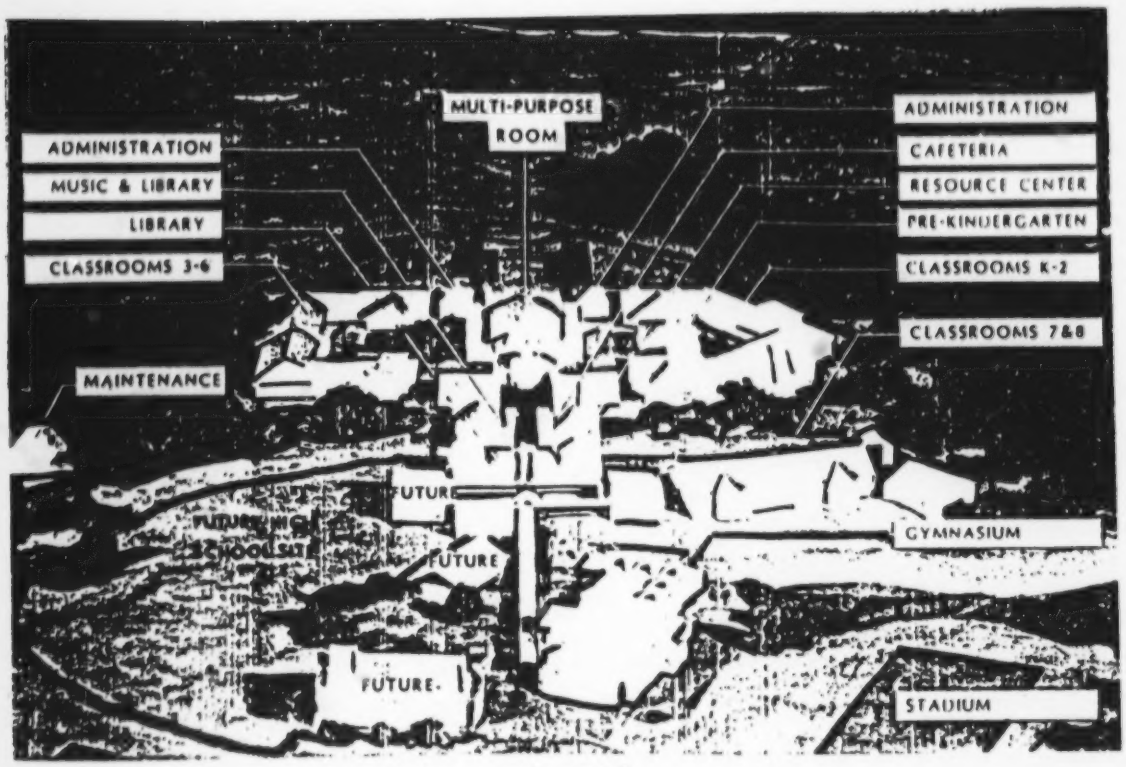
The upper schools are also different from the lower schools. The 7th and 8th grade classrooms are separate from the (future) 9th - 12th grade classroom clusters. They are two story that orient outwardly to the surrounding landscape rather than to controlled courtyards as in the lower schools and their architectural image is more imposing.

The architectural style of the overall campus was created to support the concept of an educational facility that doubles as a community center. Separate structures with sloping roofs and masonry exterior combine to create a friendly village atmosphere. The buildings rest on the site along the existing gentle slopes and are connected by covered walkways. The common organizing element is the central core of facilities that are shared by the various class groupings. These core facilities include a mutli-purpose facility, libraries, cafeterias, gym and a resource center (including computer labs.) These core facilities are organized along a spine at the center of the campus and is accessible by automobile at three separate locations providing for access by the community to these shared facilities and creating, at little additional cost, an accessible center for community services.

The gymnasium doubles as an after-hours and weekend community fitness center; the cafeteria will be the town's most attractive venue for meetings, wedding receptions, and private parties, and the library/resource building will serve as the local information and computer center. Adults and children will have access to information and computer facilities whether or not they have individual access from some other source.



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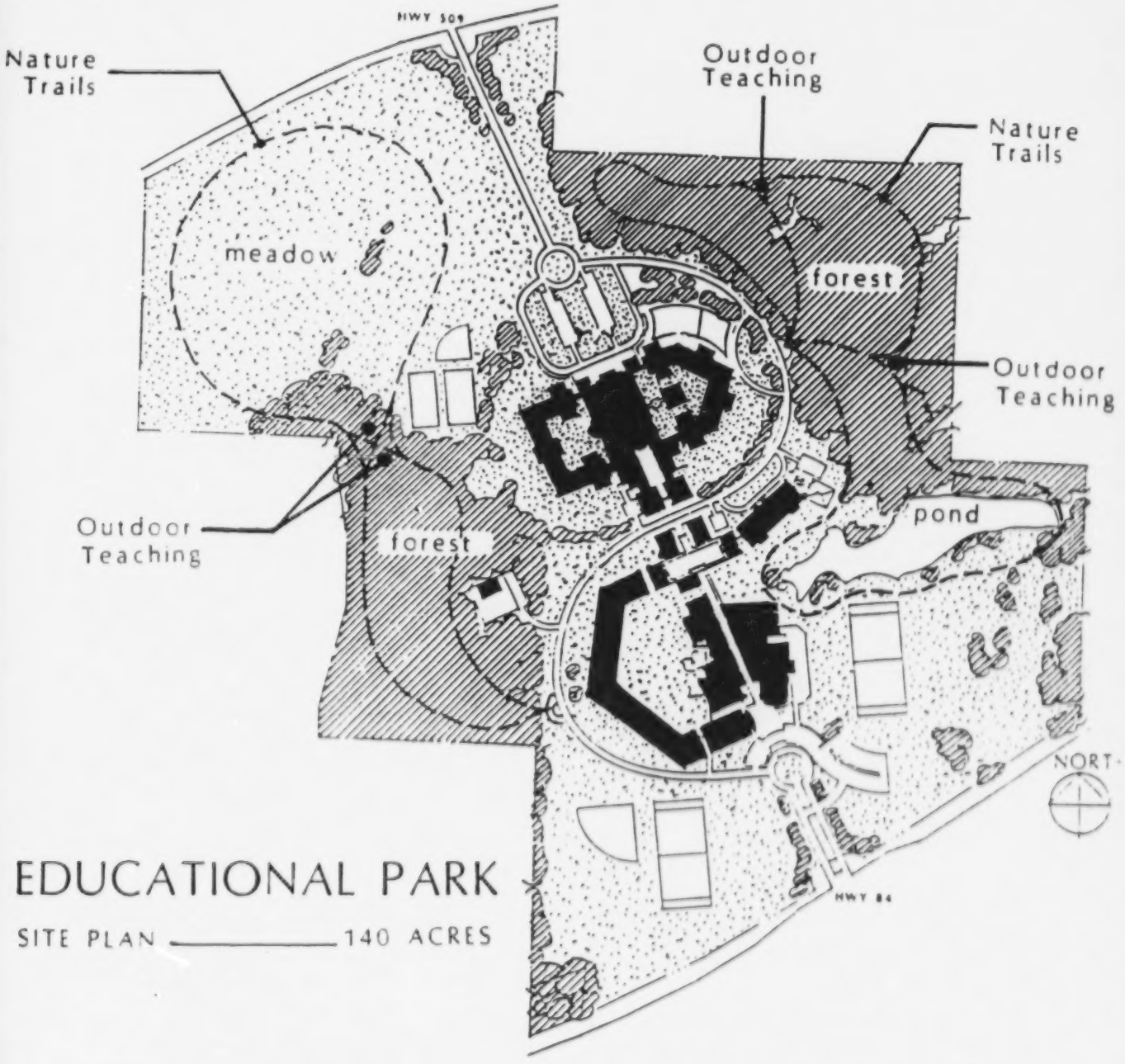

EDUCATIONAL PARK

SITE PLAN ——— 140 ACRES

The community residuals don't stop with shared buildings. Through overall planning of the full 140 acre site and consolidation of the schools' facilities falling into a cohesive and efficient campus, the community inherits the remaining acreage as a generous naturalistic public park located on the growth side of Mansfield. The park, which includes rolling meadows, hardwood forests, and a pond also serves as an environmental laboratory for the life sciences. Nature trails and outside classroom space provide teachers with opportunities to take the class for a walk, or teach in the open air.

The additional site area also provides opportunities for growth in size and in future programs such as child care, adult education, reeducation, civic, cultural and sports related facilities.

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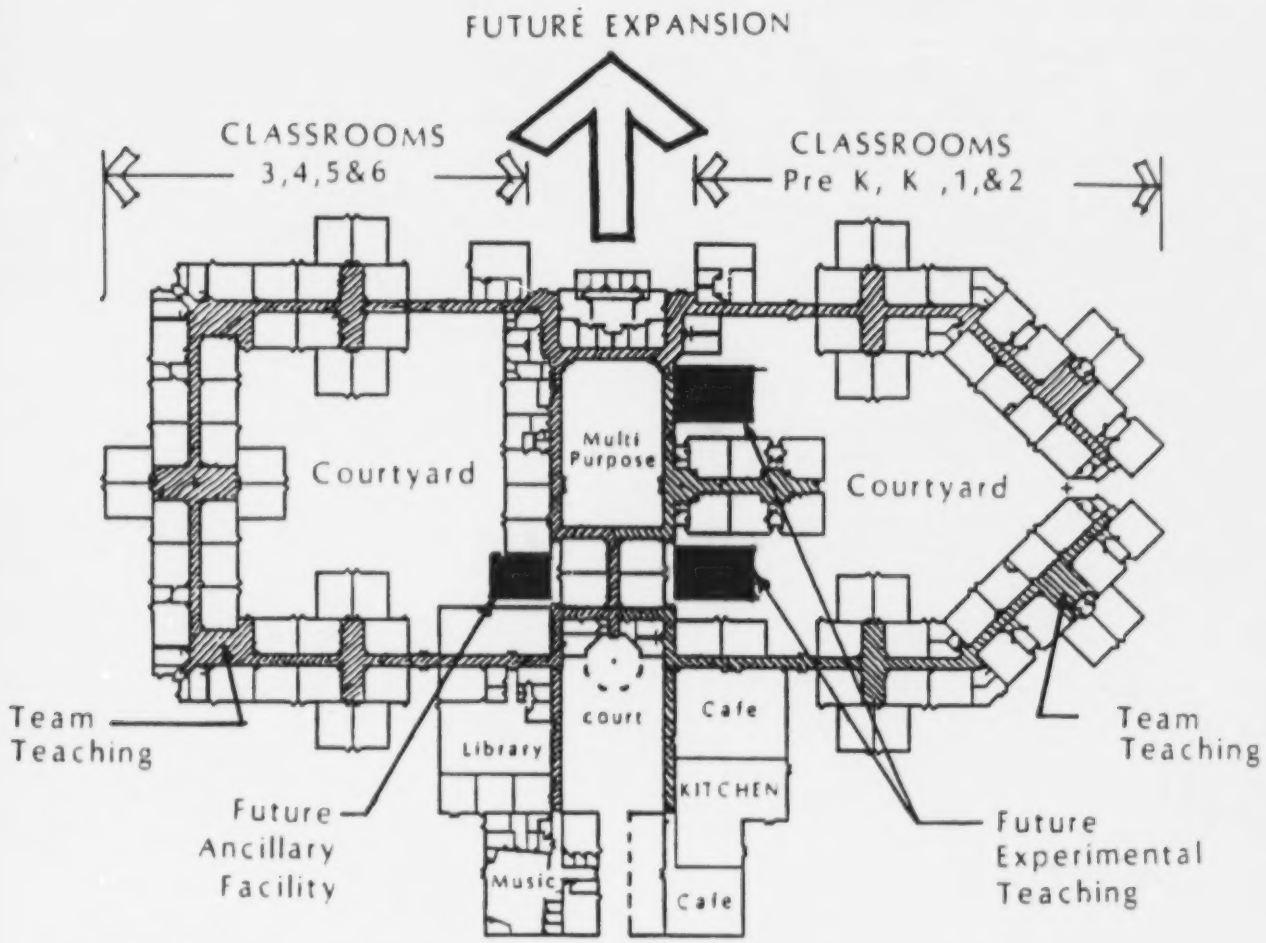
This kind of flexibility was an issue that the panel at MIT had discussed at length. Not all teachers work the same way. For this reason, classrooms in the lower school are designed in groups of eight to twelve, with a central shared space that provides an opportunity for teachers to work in teams, and to conveniently gather their classes together. The central core system is designed to provide even greater flexibility. Unbuilt spaces have been reserved along the central spine for future shared or experimental facilities where it is possible for a creative teacher to propose, design, and even construct an experimental teaching environment that then becomes a part of the shared educational (and community) facility.



LOWER SCHOOLS

PLAN ——— PRE-K thru 6

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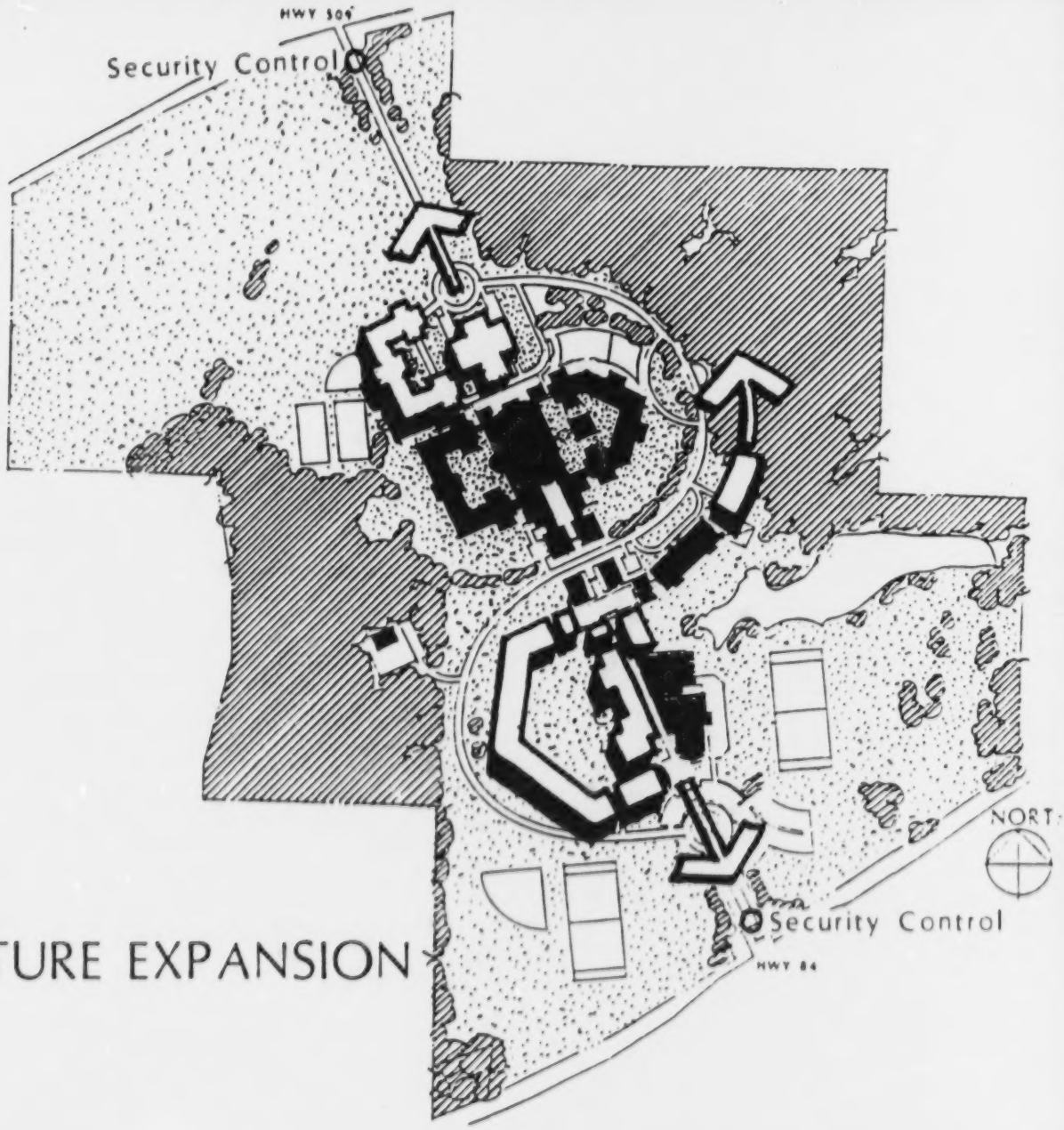
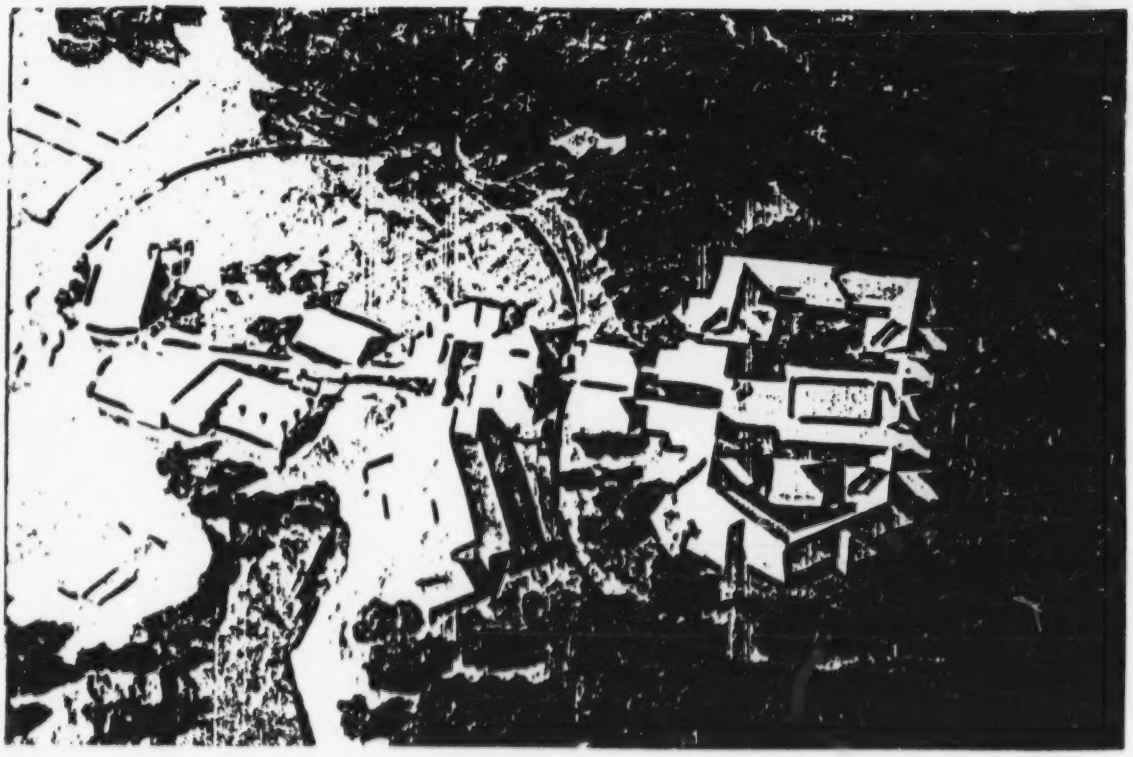


Another attribute of the linear core design is that it allows for extensive expansion in both directions, both at the lower or upper school levels without altering the classroom structures. The same is true in reverse, where additional classrooms can be added in modular clusters in a way that allows for easy access to the existing core facilities.

The consolidated campus plan also provides for more administrative and operational flexibility. Management and teaching resources can be scheduled on a school-wide basis. On-site security for the entire 140 acre complex is controlled from only two primary points of ingress and egress.

One of the most important features of the Mansfield District School design is its practicality with respect to capital expenditure. At a total cost of 12 million dollars, the facility is being constructed at less than $50.00 per square foot putting it in range near the lower one quarter percentile when compared with costs of new facilities on a national average.



CONCLUSION

Following development of the schematic design proposal based on the symposium panel's input, the design was reviewed with the Mansfield Citizen's Committee, School Board, and through its new Superintendent Walter Lee, with the appropriate staff, principals and teachers. Buildings were shifted, travel distances were reduced, and the participants contributed valuable suggestions for improvements and refinements to the functional plan. Following these reviews, the plans were modified and construction began on site in the fall of 1989.

Through a process involving some of the country's leading authorities on contemporary educational issues, an architectural firm selected for its ability to look at problem solving as a creative team effort, and the support of the De Soto Parish School Board, staff and Citizen's Committee, the design of the Mansfield District schools has addressed some important new demands being placed on educational facilities. Issues of individual identity in a consolidated school system, a synthesis of educational and community wide goals, opportunities for teaching and facility flexibility, future expansion, and overall practicality with respect to administration, operations, and costs, are all being explored in a creative way. Some of these ideas can be found in other places, and some are unique to the Mansfield situation. When seen as a whole, they provide a creative solution for the Mansfield District School System and opportunities for even more experimentation in the design and planning of educational facilities to meet today's and tomorrow's changing needs.

Case Study
Capital High School
Santa Fe, New Mexico

PROFILE OF AN EDUCATIONAL FACILITY

Opportunities to enrich the school experience challenge everyone involved in education. Santa Fe Public Schools challenged Mimbres, Inc., Architects and Perkins and Will, Associated Architects with their new high school. The architects developed the space program, assisted in site selection, and provided full architectural, engineering, and planning services. Working in close cooperation with the school, the architects analyzed their educational philosophy and specific needs to then develop creative solutions within a budget.

RESPONDING TO THE EDUCATION PHILOSOPHY

The philosophy is built on recognition of the worth of the individual student. It realizes the necessity to alter educational programs to meet changing needs of youth. Guided by the school's philosophy, the architects conducted a specific needs analysis with each department to prepare the space program and responsive designs. The prevailing need was for a school that accommodates change and growth while fostering pride in the regional heritage.

SOLVING SITE AND TOPOGRAPHY

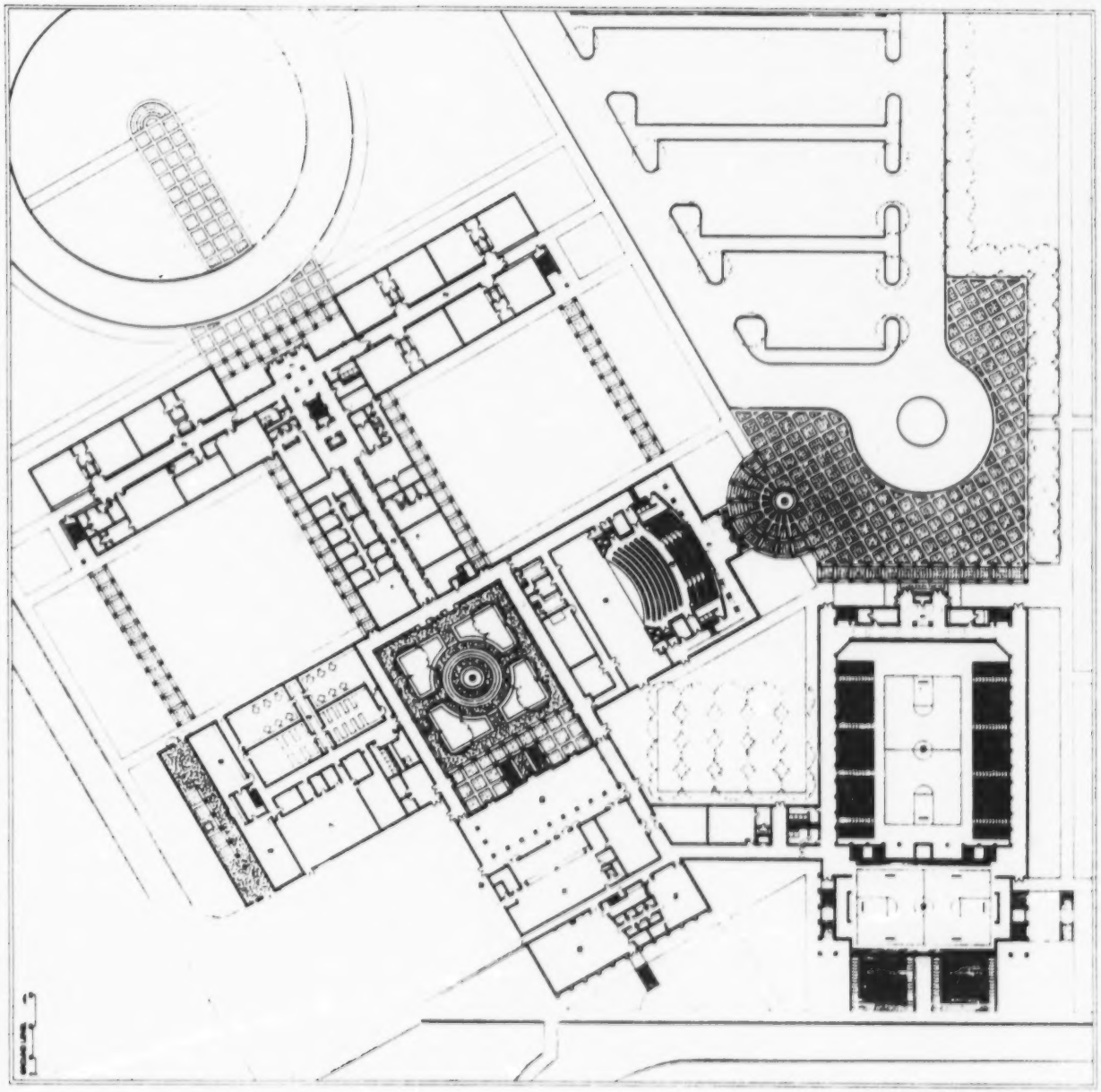
The 45-acres parcel offered a unique blend of both potential problems and opportunities. A series of arroyos (natural drainage gullies) traverse the sloping desert landscape, but picturesque mountain ranges surround it. Sited to take advantage of spectacular views of the distant mountains, the school is conceived as a series of connected pavillions that accommodates the sloping grade, maximizes views, and maintains a traditional scale. Two axes organize the school plan: The arroyo axis crossing the site, which gives the classroom pavilion a view to the Sangre Cristo Mountains, and a north-south axis for optimal sun orientation of the playfields and athletic facilities. The two access drives focus on the building entrance towers.

PROGRAMMING FOR FLEXIBILITY AND EASY EXPANSION

Connected pavilions permit incremental expansion along established circulation routes and accommodate program growth. The pavilion concept also creates delightful courtyards. A central plaza benefits four special units: The library and classrooms; auditorium/theatre; dining areas; and science and arts facilities. Flexibility for future internal change is acknowledged through partition design for the library and classrooms, and mechanical and electrical systems. Planned for 800 students, the school can expand easily to accommodate 1300.

CREATING A POSITIVE REGIONAL CHARACTER

New buildings incorporating familiar architecture reinforce pride in our heritage. The Territorial Style, indigenous to the region, is the "visual language" of the school. This style traditionally is associated with public buildings and is a mix of adobe and neo-classicism. A positive regional character is attained using elements found in many Sante Fe buildings. In the new school, long porticos, entrance portals, decorative cornices, towers, regularly spaced windows, local materials and colors all honor the local architectural tradition.



1 LOBBY
2 CLASSROOMS
3 ADMINISTRATION
4 SCIENCE
5 ARTS
6 CRAFTS
7 INDUSTRIAL ARTS
8 AUDITORIUM
9 STAGE
10 DINING
11 KITCHEN
12 SERVICE
13 BAND
14 CHORUS
15 MAIN GYMNASIUM
16 AUXILIARY GYMNASIUM

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